INSTRUCTION MANUAL

48

P6032
Signal Chopper

Tektronix, Inc. ● S.W. Millikan Way ● P. O. Box 500 ● Beaverton, Oregon ● Phone MI 4-0161 ● Cables: Tektronix

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P6032 SIGNAL CHOPPER

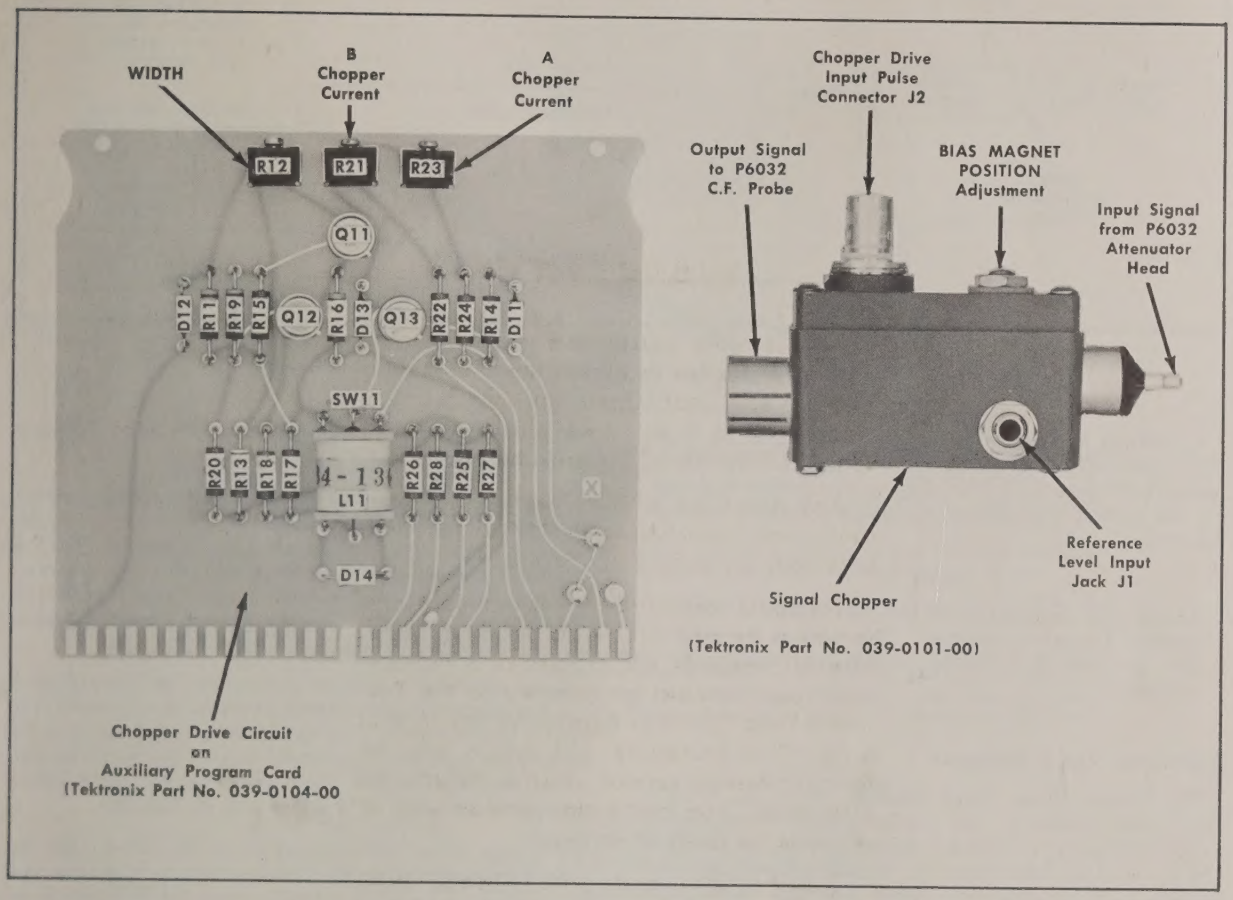


Fig. 1. Chopper Drive Circuit Card and Nose Chopper.

OPERATING INFORMATION

In many time and voltage measurements using the Type 567/6R1/3S76/3T77/262 basic system, a stable ground or other reference level for the 0% memory is required. The reference must be establishd each time the measurement is made to obtain accurate instantaneous measurements. This is accomplished by using the Signal Chopper (see Figs. 1 and 2) in conjunction with the P6032 Probe. The Signal Chopper establishes the reference during 0% zone time of the system.

The Signal Chopper (039-0101-00) is a single-pole double-throw mercury-wetted switch. Its normally-closed contacts are biased closed by a permanent magnet. These contacts connect the signal from the frequency-compensating network (R1 and C1) to the output-signal connector J3. Thus, the applied signal to the P6032 Probe attenuator is connected to the Type 567.

During the 0% zone time of the display, coil L2 is energized and the reed connects to the normally-open contact to establish a ground reference level. If an external reference other than ground is desired, apply the reference to the Reference Level Input Jack J1.

The Chopper Drive Circuit Card, 039-0104-00, (wired on an auxiliary program card; see Fig. 1) is used to drive the Signal Chopper. The card plugs into one of the programmed equipment connectors in the Type 262.

To place the Signal Chopper with its associated drive circuit in an operational condition, follow the wiring instructions described and illustrated in Fig. 3. The illustration also points out the signal path of the sweep voltage from the Type 567 to the Chopper Drive Circuit Card.

NOTE

If the Chopper Drive Circuit Card is to be operated in a standard Type 262, wire the cathode of DII to terminal 28 of the card.

If the Chopper Drive Circuit Card is to be operated as part of a special Tektronix system or if it is desired to externally program the Chopper Drive Circuit Card, then wire the cathode of DII to terminal 25 of the card.

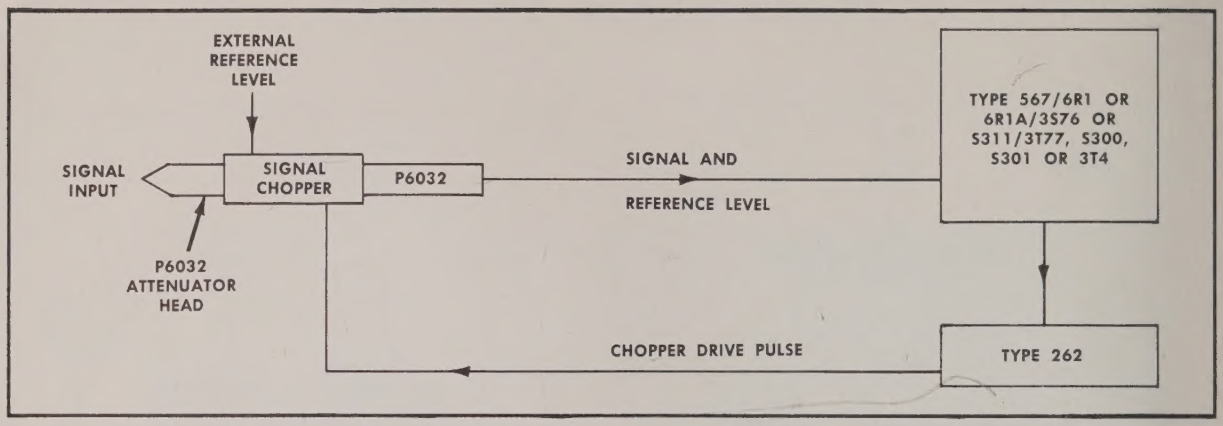


Fig. 2. Block diagram showing how the Signal Chopper fits into the basic system.

In addition to the wiring instructions in Fig. 3, the Type 3T77, S300, S301 or 3T4 must also be modified. The modification to the Type 3T77, S300, S301 or 3T4 consists of changing the holdoff capacitor in the Miller circuit to a 0.2 μf capacitor.

NOTE

The Signal Chopper must be used within a 30°-upright (nose-up) position. This allows the mercury reed switch in the Signal Chopper to operate properly.

Additional Signal Choppers

The Chopper Drive Circuit Card as shown will operate two Signal Choppers. The number of additional Signal Choppers that can be added is limited only by the capabilities of the J3138 output stage ($\approx$ 40 ma) and the current requirements of the additional Signal Choppers. Each additional Signal Chopper requires one potentiometer (311-0359-00) and one 1200-ohm resistor (301-0122-00).

BIAS MAGNET POSITION Adjustment

The Bias Magnet Position adjustment located on the Signal Chopper (see Fig. 1) can be adjusted using either of these methods:

Method I:

1. With the Signal Chopper in operation and a signal applied to the P6032 attenuator head, loosen the locknut on the Bias Magnet Position adjustment.

2. Adjust the Bias Magnet Position control to obtain a normal display; that is, a waveform which shows the reference level and signal displayed together.

3. Carefully tighten the locknut.

Method II:

1. Disconnect the Signal Chopper from the system.

2. Position the Signal Chopper in an upright position; that is, the input signal connector end of the Signal Chopper should be pointing up.

3. Using two ohmmeters for monitoring purposes, connect ohmmeter #1 between the input signal connector of the Signal Chopper and the output signal connector J3. The ohmmeter reading should be 39 ohms within the tolerance rating of resistor R1 and the meter in use. Connect ohmmeter #2 between connector J3 and ground (Signal Chopper box). The reading should be infinity.

If the ohmmeter indications as described are not obtained, the Bias Magnet Position control needs to be adjusted so the reed is biased over to close the normally-closed contacts. To perform the adjustment, loosen the locknut on the control and adjust the Bias Magnet Position control to obtain those indications described in the first part of this step.

4. Apply up to 10 ma of current to J2. Check that the +polarity is applied to the center conductor of the connector. If the adjustment is properly made, the magnetic force of coil L2 should switch the reed so the normally-open contact is closed. When this occurs the indications are as follows: Ohmmeter #1 should indicate infinity reading and ohmmeter #2 should indicate zero ohms. If the reed does not switch when 10 ma or less current is applied to L2, adjust the bias magnet position so the ohmmeter indications as described in this step are obtained.

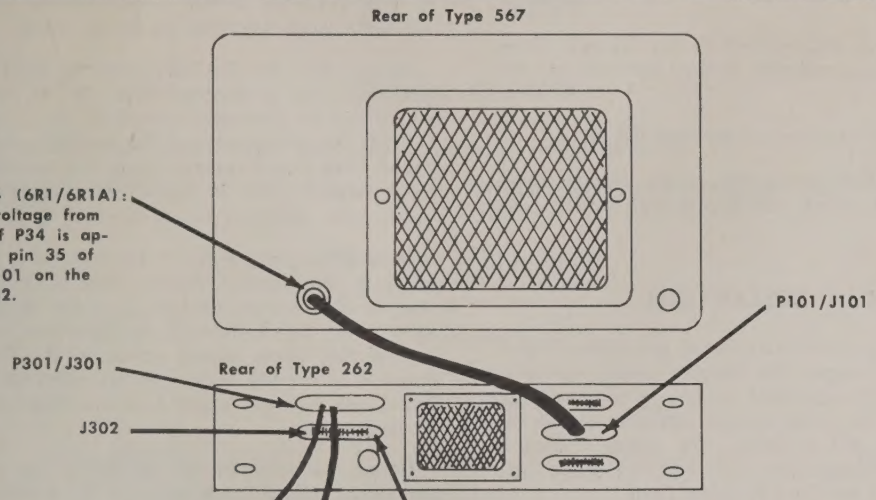
NOTE

To double-check that the adjustment is properly made, repeat steps 3 and 4 until the reed switches properly.

5. Carefully tighten the locknut.

A and B CHOPPER CURRENT Adjustment

The current to each Signal Chopper is adjusted using the CHOPPER CURRENT control for that Signal Chopper. The CHOPPER CURRENT control is adjusted for slightly more than the minimum current needed to allow proper Signal Chopper reed operation. The slight additional amount of current insures positive reed operation.

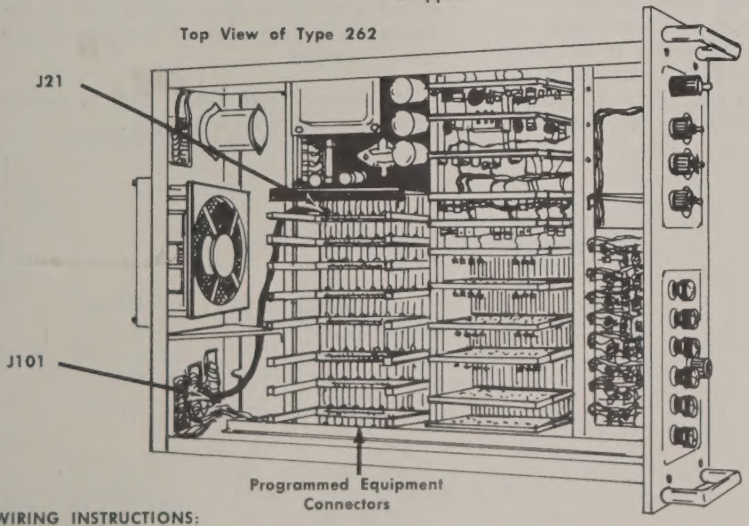

Rear of Type 567
J34/P34 (6R1/6R1A): Sweep voltage from pin B of P34 is applied to pin 35 of P101/J101 on the Type 262.
P101/J101
P301/J301
Rear of Type 262
J302
BNC Plug: Connects to SIGNAL CHOPPER jack J2.

J302 WIRING INSTRUCTIONS—On the wiring side of J302, do the following:

1. Connect a bus wire from pin 35 to pin 17. This connection supplies —25 volts to the Chopper Drive Circuit.
2. Connect a bus wire from pin 18 to pin 36. This connection provides a ground return for the Chopper Drive Circuit.

P301 WIRING INSTRUCTIONS—On the wiring side of P301, do the following:

1. Add a coax cable. Connect a BNC plug to one end. At the other end connect the center conductor to pin 23 or 24 of P301 and connect the shield to pin 18. This cable feeds the pulse from the Chopper Drive Circuit to J2 BNC connector on the Signal Chopper.



TYPE 262 WIRING INSTRUCTIONS:

1. Connect an insulated wire from pin 35 of J101 to pin A of J21. This connection applies the 6R1/6R1A sweep sawtooth to the Chopper Drive Circuit.
2. Insert the Auxiliary Program card (containing the Chopper Drive Circuit) into an unused programmed equipment connector in the Type 262 Programmer. When the cathode of D11 is wired to terminal #28, the Signal Chopper will be enabled through the program select line simultaneously with the measurement program card in the parallel card position.

Fig. 3. Illustration showing where the sweep voltage originates (J34/P34, pin B) and where to add wiring to make the chopper operate properly.

WIDTH Adjustment

The WIDTH control R12, located in the Chopper Drive Circuit (see Fig. 1), is adjusted during operation of the system as follows:

1. Display a signal waveform on the Type 567 crt.

2. Adjust the WIDTH control R12 so the chopper reference level remains at ground reference through the 0% zone time.

CIRCUIT DESCRIPTION

The Chopper Drive Circuit consists of a bistable Schmitt circuit and a driver stage. The bistable circuit, consisting of Q11 and Q12 with associated circuitry, is triggered into its stable states by the sweep voltage available at J34/P34 (pin B) of the Type 6R1 or 6R1A. The sweep voltage is applied from pin B through pin 35 of J101/P101 of the Type 262 to pin A on the Auxiliary Program Card.

Triggering of the circuit into one of its stable states occurs during the sweep retrace time. When triggered at this time, the bistable circuit initiates the pulse which is applied to the driver stage consisting of Q13 and associated circuitry. The pulse output from this stage drives the Signal Chopper. The pulse duration, determined by the WIDTH control R12, lasts through the sweep holdoff time and a portion of the sweep sawtooth rise. The rising sweep voltage is used to force the circuit into its other stable state at which time the pulse terminates.

Assume the sweep has reached its most positive level and is now in the retrace portion of the cycle. During retrace, the sweep drops through a voltage level that causes D12 to conduct. The level at which D12 conducts is determined by the setting of the WIDTH control R12. Conduction of D12 causes Q11 to turn off and Q12 turns on. Through regeneration the fall at the collector of Q12 is very fast. The falling voltage produces a fast negative-going pulse which is applied through SW11 to the driver stage.

Assume that the Auxiliary Program Card is being programmed from a standard Type 262 at this time. Then, pin 28 will be connected essentially ($\approx$ 1 volt) to ground, L11 will be energized and the contacts of SW11 will be closed. The closed contacts apply the negative-going pulse to the base of Q13. Transistor Q13 turns on and a positive-going pulse occurs at the collector of Q13.

The positive-going pulse at the collector of Q13 is applied to L2 in the Signal Chopper. Coil L2 energizes and the reed of SW1 moves over to close the normally-open contacts in the circuit between the Reference Level Input jack J1 and the output signal connector J3. Thus, during the duration of the 0% zone time the reference level is established and the input signal from the P6032 attenuator head in disconnected.

During the sawtooth-rise portion of the sweep voltage, the rising voltage back biases D12. Simultaneously, Q11 turns on, Q12 turns off and Q13 turns off. Coil L2 de-energizes and the input signal to the P6032 attenuator head passes through the attenuator and Signal Chopper normally-closed contacts of SW1 to the P6032 C.F. Probe, and on to the Type 567/6R1/3S76/3T77 system. This action takes place on every sweep of the time-base unit. Diode D13 is a protection diode for Q13 during Q13 turnoff. R25, R26, R27 and R28 are required for the P6038 chopper.

The WIDTH control is adjusted so the normally-open contacts of the Signal Chopper are closed for a time longer than the 0% zone time. The Bias Magnet Position adjustment is set so the reed switch normally-closed contacts are closed when L2 is de-energized and so the normally-open contacts will close when L2 is energized with 10 ma or less current applied.

The mercury reed switch SW1 is capable of operating at a pulse rate of up to 100 cps.

PARTS LIST

SIGNAL CHOPPER

* Indicates component manufactured by or for Tektronix, reworked and/or checked.

NOTE: For those parts which have no part number, order by instrument type and complete description of part.

Electrical Components

Ckt. No.	Tektronix Part No.	Description			S/N Range
		Capacitor			
C1	281-0610-00	2.2 pf	Cer	200 v ±0.1 pf	
		Inductors			
L1	276-0507-00	Core, Ferramic Suppressor			
L2	- - - - - -	Reed Switch			
		Resistor			
R1	317-0390-00	39 Ω	1/10 w	5%	
		Switch			
SW1	*260-0334-00	Mercury			

Mechanical Components

J1	136-0094-00	SOCKET, miniature
J2	131-0274-00	CONNECTOR, BNC, insulated
J3	205-0038-00	SHELL, attenuator, brass tube
	200-0252-00	COVER, top
	202-0054-00	BOX
	206-0093-00	TIP, probe assembly
	210-0020-00	LOCKWASHER, internal, #12
	210-0201-00	LUG, solder, SE #4
	210-0562-00	NUT, hex., 1/4-40 x 5/16 inch
	210-0577-00	NUT, hex., 3/8-32 x 9/32 inch
	210-0819-00	WASHER, bakelite, 1/4 ID x 1/2 inch OD
	210-0940-00	WASHER, steel, 1/4 ID x 3/8 inch OD
	211-0094-00	SCREW, 4-40 x 1/2 inch, THS phillips
	213-0075-00	SCREW, set, 4-40 x 3/32 inch
	214-0198-00	SPRING, grip fastener
	358-0145-00	BUSHING, insulator, ceramic

PARTS LIST

CHOPPER DRIVE CIRCUIT

* Indicates component manufactured by or for Tektronix, reworked and/or checked.

NOTE: For those parts which have no part number, order by instrument type and complete description of part.

Electrical Components

Ckt. No.	Tektronix Part No.	Description			S/N Range
		Diodes			
D11	*152-0107-00	Silicon Replaceable by 1N647			
D12	*152-0107-00	Silicon Replaceable by 1N647			
D13	*152-0107-00	Silicon Replaceable by 1N647			
D14	*152-0107-00	Silicon Replaceable by 1N647			
		Inductor			
L11	- - - - - -	Reed Switch Drive			
		Transistors			
Q11	*151-0103-00	Silicon Replaceable by 2N2219			
Q12	*151-0103-00	Silicon Replaceable by 2N2219			
Q13	*151-0087-00	Silicon Selected from 2N1131			
		Resistors			
R11	301-0334-00	330 k	½ w		5%
R12	311-0454-00	100 k		Var	WIDTH
R13	301-0914-00	910 k	½ w		5%
R14	301-0272-00	2.7 k	½ w		5%
R15	301-0123-00	12 k	½ w		5%
R16	301-0392-00	3.9 k	½ w		5%
R17	301-0102-00	1 k	½ w		5%
R18	301-0113-00	11 k	½ w		5%
R19	301-0334-00	330 k	½ w		5%
R20	301-0105-00	1 meg	½ w		5%
R21	311-0359-00	5 k		Var	B CHOPPER CURRENT
R22	301-0122-00	1.2 k	½ w		5%
R23	311-0359-00	5 k		Var	A CHOPPER CURRENT
R24	301-0122-00	1.2 k	½ w		5%
R25	301-0223-00	22 k	½ w		5%

Resistors *(Cont'd)*

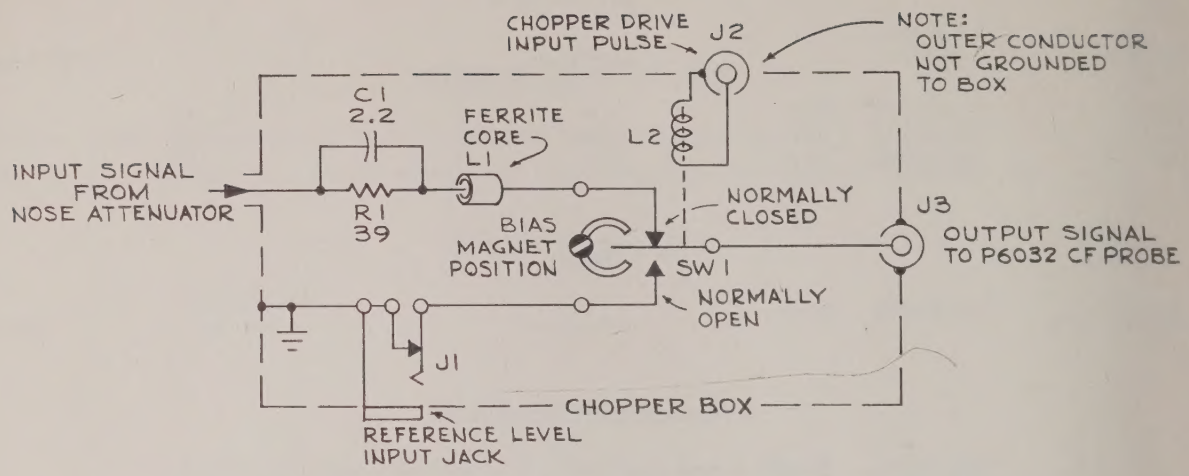
Ckt. No.	Tektronix Part No.		Description		S/N Range
R26	301-0223-00	22 k	½ w	5%	
R27	301-0223-00	22 k	½ w	5%	
R28	301-0223-00	22 k	½ w	5%	

Switch

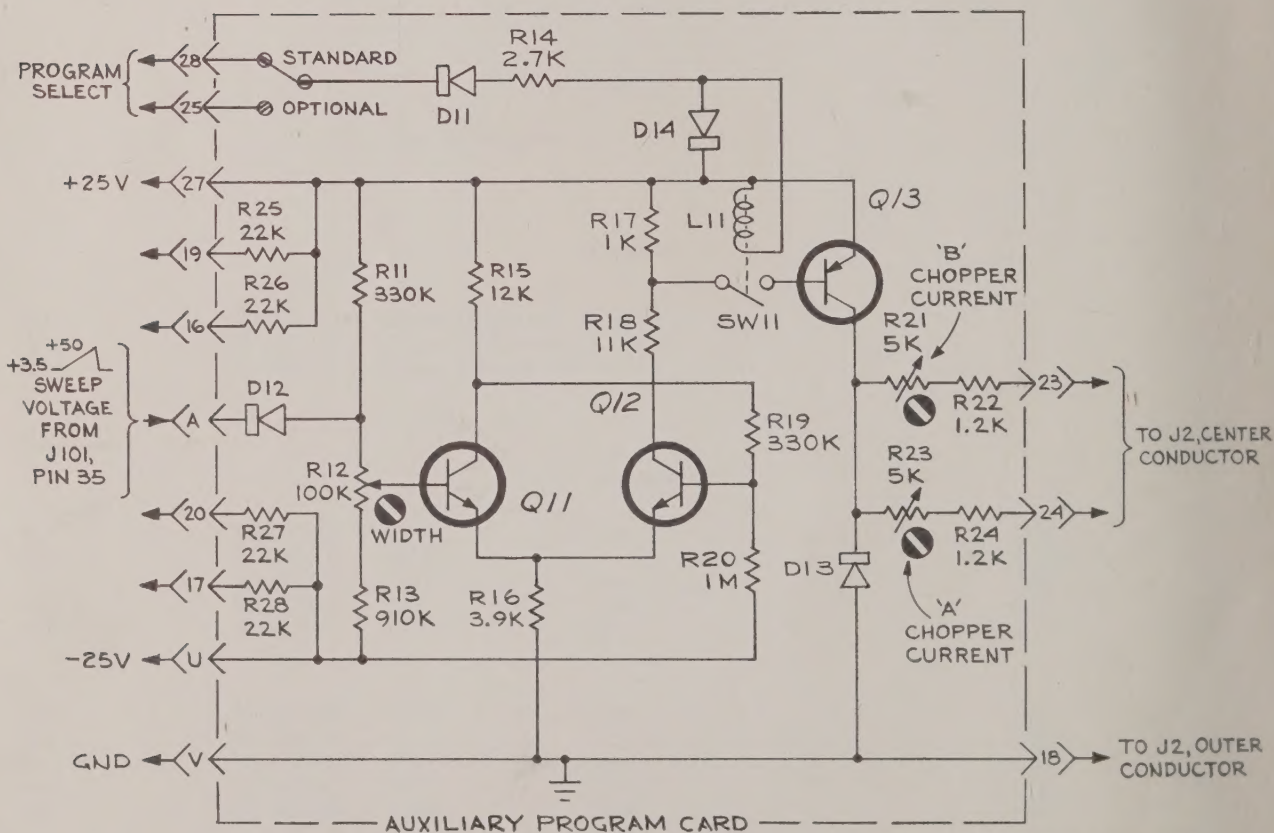
SW11	260-0552-00	Reed

Mechanical Components

388-0599-00	BOARD, etched circuit
136-0183-00	SOCKET, transistor, 3-pin



SIGNAL CHOPPER SCHEMATIC



SEE PARTS LIST FOR SEMICONDUCTOR TYPES

CHOPPER DRIVE CIRCUIT

P6032 B MRH 265

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